No Silver Bullets: On the Humility of Designers

by Jason Pearson

While individual design decisions are important, the most valuable contribution that designers can make toward a sustainable future is their collective humility. It is the foundation of their value as innovators. Jason Pearson explains how GreenBlue works with communities of designers and businesspeople to enable the collaborative redesign of industrial systems to align with natural systems for the benefit of current and future generations.

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The humility of designers may be our best hope for a sustainable future. That's right. *Humility*.

As an industrial society, we face serious global challenges, and many socially responsible designers are eager to play a constructive role in helping to design green, or sustainable, solutions that can address these challenges. While these individual design solutions may be important, the most valuable contribution that designers, collectively, can make toward a sustainable future is their humility… a humility that is embedded in design itself—design being a process that rejects claims of perfection and insists upon ongoing innovation and improvement.

Designers fail (prototype) their way to success.

In his book, *To Engineer is Human: The Role of Failure in Successful Design*, the engineering historian Henry Petroski demonstrates that successful design emerges from repeated failures. In all his books, Petroski argues that engineering innovation at all scales, from paper clips to suspension bridges, emerges from a standard, iterative process in which we effectively fail our way to success:

- Analyze a current problem.
- Prototype an alternative solution.
- Get feedback from the prototype.
- Analyze the feedback.
- Prototype a new alternative solution.
- And so on.

Each successive prototype, while perhaps an improvement on its predecessor, is still technically presumed to be a partial failure, since it will be superseded by a superior design in the future.[1] Even the paper clip, which Petroski holds up as an icon of the design efficiency that emerges from successive collective prototyping, will one day be superseded by a better design not yet conceived. This is the cycle of design innovation: analysis, prototype, feedback, repeat (Figure 1).

As designers, we are intimately familiar with the process of failing our way to success, and we use the process in the service of clients' objectives. Typically, our design work begins with a question, often in the form of a design brief: "(How) could we…?" In the best, most exciting design projects, the question sounds almost impossible, and these almost-impossible questions are often the basis for the most innovative and creative new design solutions. This is the magic of design. We begin with a seemingly impossible goal, and then begin prototyping to see if we can find our way there. With each new prototype, we can't even be sure that we are getting closer to our goal, but the best designs emerge when we let that experimental process take its course, effectively failing our way to success (Figure 2).

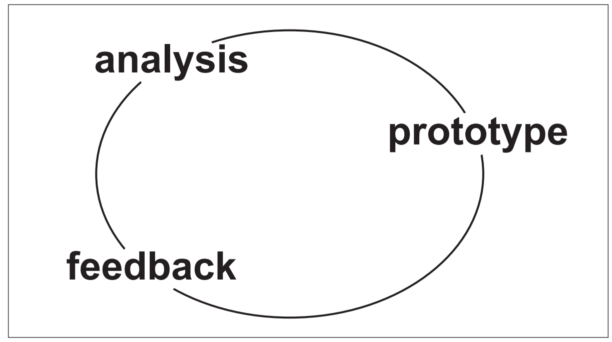

Figure 1. Design innovation cycle: Invention and innovation follows an iterative process: analysis, prototype, feedback. In effect, we fail our way to success.

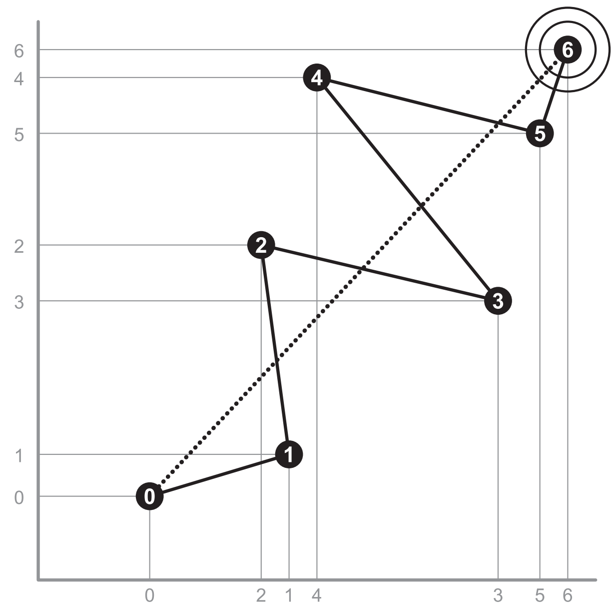

Figure 2. Prototyping: Successful design innovation depends on three key ingredients: a clear definition of success (#6); a willingness to experiment with different options or prototypes (#1 to #5); and effective metrics for assessing each prototype for its relative merits (the two axes). In this case, each successive prototype represents an improvement on at least one metric (or axis).

As an industrial society, we are experiencing global design feedback.

This model of design innovation is critically important for understanding our current global challenges. As an industrial society, we have created a massive global prototype, which we call the modern industrial system, and we have exported it around the world. It is an incredibly complex prototype, and in many ways it serves us well. It delivers goods and services to millions of people. It provides the technical infrastructure for advances in science and medicine. It enables the creation of low-cost affordable housing for many. All in all, many of us have seen it as a pretty good prototype for industrial activity.

But for the past 50 years, as an industrial society, we have begun to acknowledge, with increasing urgency, that our current prototype for industrial activity is generating alarming, system-wide negative feedback at every scale. At the global scale, we see feedback from our industrial systems in the form of ozone depletion, climate change, and widespread habitat loss, and on a smaller scale our own bodies have begun to provide design feedback in the form of our "body

1. Although Petroski does not emphasize the point, the engine of innovation is driven, in part, by ongoing changes in the context of design. Solutions that work well in the present become insufficient in the future as social needs and values change. This has been, and will always be, the case.

burden": the buildup of synthetic chemicals and heavy metals in our bodies.[2]

We did not intend, as a society, to design an industrial system that created negative feedback. But as designers, we should not be surprised. Every act of invention is an act of prototyping, and all prototypes eventually generate feedback that we can use as the basis for new prototypes. In this case, the feedback has been alarming in its scale. The planet and its ecosystems are in crisis, and our industrial systems are the likely cause.[3] As a society, we have been analyzing this feedback, and we have drawn a frightening conclusion: We have become victims of the unintended consequences of our own designs. In other words, we are committing on a grand scale the most tragic act any species can commit—we are soiling our own nest.

Our current industrial systems are unsustainable. If we continue to operate our industrial systems unchanged, we will destroy our own planet. Further, if we extend the current template of industrial activity to less industrialized parts of the world, we will accelerate this destruction, exhausting the resources of the planet many times over.[4] This is the lesson we have been forced to draw from the negative feedback of our industrial systems. We need to redesign our industrial systems or we will destroy ourselves.

Design decisions are linked to larger industrial systems.

GreenBlue, the nonprofit design institute that I direct, works to enable the collaborative redesign of our man-made (technical) systems to align with natural (biological) systems for the benefit of current and future generations. While industrial systems have undeniably improved the quality of life for many (for instance, production of food, medical advances, and so on), these same systems are also depleting natural resources and imposing burdens on ecosystems globally. We believe that industrial systems can be redesigned to reverse these conditions and positively contribute to human and ecosystem health.

In order to achieve this redesign, we organize our work by industry sector. The impacts associated with industrial activity and the opportunities for improvement tend to be unique to each sector, and new ideas that we share across sectors rachet up the impact of our work. From a designer's perspective, the sector-wide approach allows us to ask more-ambitious design questions than can be posed by one company or by one project at a time. In every case, we promote sector-scale sustainability by connecting specific design choices to their broader systemic implications, along the entire sector supply chain, for people and the planet.

To ensure that our work leads to actual implementation, we create practical design and decision-making tools that enable companies to shift toward better practices. These resources are intended to target key "design points" that influence entire industrial systems, from upstream impacts (resource consumption) to downstream impacts (consumer choices, end-of-life fates). For example, if a packaging designer specifies paper, the demand for tree fiber increases, setting in motion industrial processes from timber harvesting to pulp production, which have specific human and environmental health impacts. Linking design decisions with their systemic

2. In a recent study conducted by the US-based nonprofit organizations Environmental Working Group and Commonweal, researchers tested the blood and urine of nine volunteers, finding 171 of 214 industrial compounds, pollutants, and other chemicals tested, including chemicals linked to birth defects and developmental delays, immune system toxicity, and cancer. Subsequent research has confirmed these results, and also highlights the presence of specific toxicants, such as rocket fuel, in mothers' breast milk. See www.bodyburden.org.

3. This is not the forum in which to argue this point. Readers who are in doubt about the severity of the status and causes of the global resource crises that we face may wish to study any of the most recent State of the World reports published by the Worldwatch Institute (www.worldwatch.org).

4. According to research conducted by the World Wildlife Federation (WWF) as part of its One Planet Living program, if every person lived like a European, we would need three planet Earths in order to meet global needs. If every person lived like a North American, we would need five. (see www.panda.org/oneplanetliving/). Fundamentally, this is not a problem of consumption; however, it is a problem of industrial system design. The impacts associated with a European or American way of life are impacts that result from the ways in which we have designed our industrial economy (that is, transportation infrastructure, food distribution, and so forth).

consequences, such as natural resource depletion, ecosystem toxification, and greenhouse gas emissions, is *the* point of focus for GreenBlue.

The private sector has asked narrow design questions.

In his bestselling 1993 book, *The Ecology of Commerce*, Paul Hawken summarized a fundamental point that has emerged from the field of ecological economics: "Markets are superb at setting prices, but incapable of recognizing costs."[5] In other words, although markets do a fine job of establishing the relative prices of goods and services, there is no guarantee that these prices will reflect the hidden, "externalized" costs of production.

For instance, when a designer sitting in an office in California compares two brands of paper at the same price point, that designer has no way of knowing, based on price alone, whether the production of either paper has caused hidden human or environmental health costs that will ultimately be borne by society at large. One of the papers might have been produced locally using renewable energy with fiber sourced from a mix of post-consumer recycled (PCR) content and sustainably harvested trees/forests. The other paper might have been produced in an overseas mill not subject to environmental regulation, with resulting environmental pollution affecting not only the local population, but even, thanks to the global movement of airborne pollutants, the very community in California where the designer makes her home.[6] But she really has no way of assessing these hidden costs based on price alone (Figure 3). The costs to society of the second brand of paper—in the form of healthcare costs, premature deaths, workplace injuries, social injustice, and loss of biodiversity and habitat—are real costs. Somewhere, somehow, we as a society will have to pay those costs. But those costs are externalized; they are not accounted for in the price. So, as Hawken emphasizes, the market does a great job of setting prices, but those prices do not necessarily indicate the true social and environmental costs of industrial activity.[7]

For designers who work in the private sector, this has posed a dilemma. We know that designers are only as good as the design questions they are able to ask. For all designers, these questions are determined by their context of practice (see Figure 4 on next page), and for most professional designers, by the design briefs provided by their clients. The questions embedded in these briefs are often explicitly commercial: How can my product be designed to reduce cost? How can my brand be designed to gain market share? In other words, commercial clients often ask questions in purely commercial terms, and the resulting design solutions are ultimately measured in terms of immediate, visible, commercial benefit. Rare is the client who has asked: How can my brand design result in greater public benefit? How can my product be redesigned to address hidden social costs?

We must recognize that, frequently, the private sector has been unprepared to ask design questions that address the negative feedback we

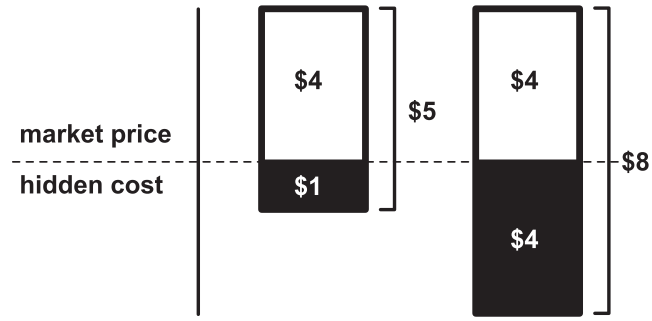

Figure 3. Externalized costs: As Hawken notes, markets are superb at setting prices, but incapable of recognizing costs. In this example, two products compete in the marketplace at the same price ($4). The first, however, is produced in a relatively responsible manner, resulting in only $1 of hidden social costs. The other product, however, results in significant negative impacts that are hidden, or externalized, so that the total cost to society is actually twice the market price of $4.

5. Hawken, Paul. *The Ecology of Commerce: A Declaration of Sustainability.* (New York: HarperBusiness, 1993), p. 75.

6. This example is not wholly fictional. California has some of the most stringent environmental regulations in the world, and more than 75 percent of its airborne carbon particulate emissions originate in Asian countries not subject to the same levels of pollution control. (See Hadley, et al., "Trans-Pacific Transport of Black Carbon and Fine Aerosols into North America," in *Journal of Geophysical Research*, vol. 112, 2007).

7. There is a whole social and intellectual movement dedicated to "internalizing" social costs, primarily through government regulation. But we are a long way from the day when prices accurately reflect the true social costs of industrial activity, and the effort to internalize costs is not my focus here.

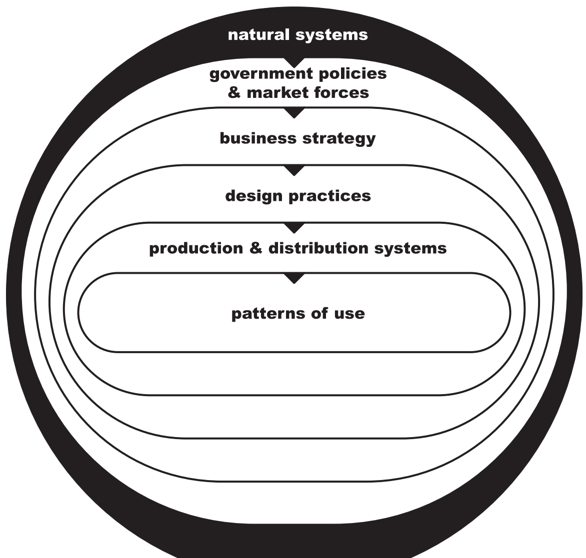

Figure 4. Contexts of practice: All activity in an industrial economy occurs within contexts of influence, and the entire industrial economy depends upon the natural systems that sustain us. Each successive context of influence determines the possibilities of action and innovation. In the case of designers, their context of practice (the questions they are able to ask) is typically determined by the business imperatives of their commercial clients. Their decisions, in turn, ultimately influence the options and patterns of use available to consumers.

are receiving from our global industrial systems. This is not to say that businesspeople have been unaware of the feedback, but they have had little financial incentive to include it in the design questions they ask. This is now changing, and with these changes come better design questions.

Sustainability asks for better design questions.

As designers, many of us recognize that the global challenges faced by industrial society, as a result of the unintended negative consequences of industrial activity, can be seen as feedback from design failures. And as designers, we are in a position to help frame a good design question in response: *How can we design, prototype, and realize truly sustainable industrial systems?*

Over the past 10 years, this question has been asked with increasing urgency. In my work and in the work of my colleagues at GreenBlue and elsewhere, we share a common vision for the sustainable future of our industrial systems. The precise language of this vision varies across different authors and communities of practice,[8] but it can be broadly summarized as a more detailed version of the above design question:

How can we design, prototype, and realize industrial systems that ...

... Run on clean, renewable energy
... Use all resources prudently and productively
... Support healthy, living systems
... align market incentives with long-term social good
... Encourage social justice[9]

Let's call this multi-pronged, imaginative, provocative set of questions the Big Question. And again, it is a design question. Clients come to designers with a question: "How could we…?" In this case, we, as an industrial society, are our own client. We are asking ourselves, as an industrial society, the Big Question: "How can we design, prototype and realize… a better future?" Looking again at Figure 2, we are asking, "How can we define a truly ambitious future for industrial systems, and how can we then prototype our way toward this future?" We have given a name to our shared desire for a positive future: sustainability.

Design questions (and sustainability definitions) vary by sector.

At GreenBlue, we focus the Big Question by asking: *How can we design, prototype, and realize sustainable products and systems in specific industry sectors?* In our work, the broad, conceptual language of sustainability becomes real and practical in the everyday work of designers, engineers, and businesspeople in specific industry sectors. In each sector where we work, we try to ask a version of the Big Question that is specific to that sector. For example, the companies that participate in our Sustainable Packaging Coalition (www.sustainablepackaging.org) came

8. For examples of robust, principles-based definitions of sustainability, see, for example, The Natural Step (www.naturalstep.org) and Natural Capitalism (www.naturalcapitalism.org).

9. For a more detailed treatment of these concepts, see also: J. Pearson, *Design & Sustainability: Opportunities for Systemic Transformation.* (GreenBlue, 2007), pp. 10-21.

together to collaboratively define and pursue a common question[10]:

How can we design packaging that ...

- ... Is beneficial, safe, and healthy for individuals and communities throughout its life cycle
- ... Meets market criteria for performance and costs
- ... Is sourced, manufactured, transported, and recycled using renewable energy
- ... Maximizes the use of renewable and recycled source materials
- ... Is manufactured using clean production technologies and best practices
- ... Is made from materials healthy in all probable end-of-life scenarios
- ... Is physically designed to optimize materials and energy
- ... Is effectively recovered and utilized in biological and/or industrial closed-loop cycles

This sector-specific design ambition is laid out in our *Definition of Sustainable Packaging v. 1.0*, and it defines a long-term goal for packaging sustainability (the "target" in Figure 2). As the members of the Coalition prototype solutions for improved packaging, they can measure their success against this definition.

New definitions of quality create new opportunities for design innovation.

Any designer reading the definition of sustainable packaging will recognize that each of the aspects of the definition is a design constraint. This underscores an important principle of GreenBlue's work: *Sustainability is an expansion of existing definitions of quality.* Ten years ago, a packaging designer might have focused exclusively on three constraints: cost, technical performance, appearance. These constraints were the metrics by which the quality of a package design could be measured. Today, as we respond to the negative feedback we are receiving from our industrial systems, we are redefining our definitions of quality by adding metrics or design constraints (see Figure 5). In every sector, products are increasingly measured by a range of new metrics related to sustainability, and these metrics are a new set of constraints for designers.

This is an important point for design managers. New metrics or design constraints associ-

10. This question is based on the *Definition of Sustainable Packaging v1.0*, which was created in collaboration with the membership of the Sustainable Packaging Coalition and released by GreenBlue in 2005. It is available for download at www.sustainablepackaging.org.

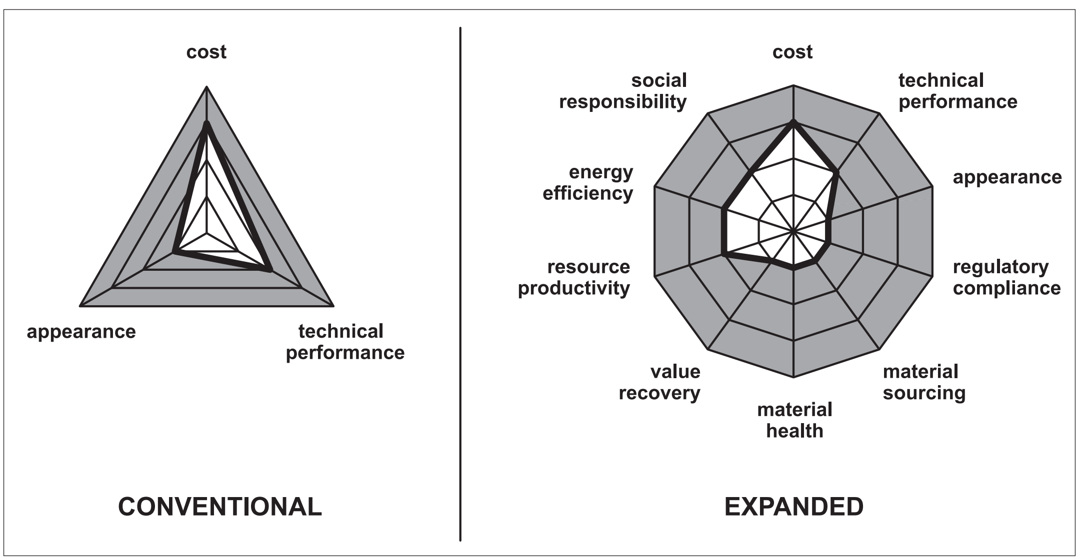

Figure 5. Expanding definitions of quality: Sustainability is another name for the range of new constraints that define our design questions. These new constraints are both a challenge and an opportunity. If the dark line represents the current performance of one of our designs, then the grey area outside that line represents the design opportunity zone for potential improvement. If conventional definitions of quality only offered three or four areas of potential improvement and differentiation, new constraints open entire new areas of design innovation opportunity.

ated with the pursuit of sustainable solutions are a challenge, but they are also an opportunity. If, 10 years ago, there were only three or four factors on which a product could be differentiated from its competitors in the marketplace, there are now multiple factors on which it can be differentiated. As designers become more familiar with these constraints, they will increasingly be able to seize opportunities for simultaneous improvement in multiple areas, thereby transforming challenge into opportunity. The range of innovation opportunity expands with every increase in design constraints, as can be seen in Figure 5.

In our work, GreenBlue insists upon this point by promoting the principle of *multi-attribute assessment*. As in any process of prototyping, while optimization is the goal, tradeoffs are inevitable. Designers may strive to optimize performance across every relevant factor of evaluation, but no design is likely to achieve perfection across all. Rather than focus on which designs or products are green or sustainable, GreenBlue focuses on which attributes are relevant for an industry sector or product category, and then encourages multi-attribute-based assessment of current prototypes in the sector or product category.

In the world of consumer products, the analogue for our approach would be the *Consumer Reports* approach, which continues to foster ongoing improvement and innovation, as opposed to the *Good Housekeeping* Seal of Approval approach, which tends to obscure the detailed differences among products on which future improvement and differentiation can be based (Figure 6).

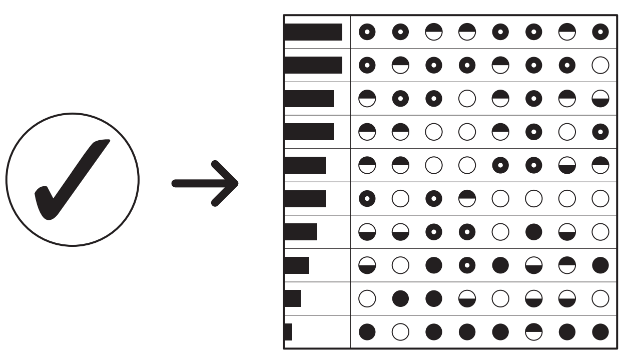

Figure 6. Multi-attribute assessment: Since no design solution will ever be perfect or sustainable, multi-attribute assessment offers the best method for identifying areas for potential improvement and innovation. Rather than using a *Good Housekeeping* Seal of Approval approach to talk about green or sustainable products, we are better served by emulating the *Consumer Reports* approach, specifying relevant attributes of assessment as a basis for ongoing innovation and improvement.

Designers and design managers are particularly well placed to understand and translate this approach. As professionals, we are skilled and experienced in transforming multiple priorities and constraints into a range of possible design options, each of which offers a unique way to address them. As the range of priorities and constraints expands in response to the negative feedback from our industrial systems, design managers are positioned to integrate these new priorities and constraints into design prototyping and decision-making. As individual companies prototype solutions, new constraints become the metrics that are used to assess whether each possible solution moves us closer to a sustainable future. In Figure 2, they are the axes by which each prototype can be measured.

There is no such thing as a perfect (sustainable) design solution. (And that's OK!)

Designers and design managers would therefore be best served by discouraging references to green or sustainable design solutions or products. Such references minimize the global challenges facing us, while oversimplifying and devaluing the important role that designers can play in developing multiple prototypes to address those challenges.

As designers, we know that no design solution is ever perfect. There is always room for improvement. This is the attraction and magic of design—a solution that seems perfect today will show its flaws tomorrow, opening up opportunities for fresh design innovation. By extension, no design solution can ever be green or sustainable, for two reasons.

First, sustainability is an attribute of systems, not of individual designs or products. The negative feedback we have received is an alarming indicator of unsustainable industrial systems. No single product or design solution will solve these global problems. Individual designs, products, or processes might move us toward better industrial systems, but a sustainable system will only be achieved as a synergy of millions of design decisions pulling collectively in positive ways toward a complete system redesign. For designers and design managers, this is a particularly important point, since it speaks to the ongoing role for designers in the pursuit of sustainability. It is precisely because there are no silver bullets, no sustainable products or designs, that we need the collective expertise of designers and design managers to support ongoing society-wide efforts to define and pursue sustainability.

Second, sustainability is an ambition for the future, not a checklist for the present. Sustainability is the name we give to a positive future, but a future that we do not yet know how to achieve. We are in the midst of a global effort to create solutions that will hopefully move us closer to that future. But no single solution will provide a comprehensive solution. There will always be room for improvement. That is the point. There are no silver bullets.

And that is why the humility of designers may be our best hope for the future. Professional designers know better than anyone that the task of design is never complete. In fact, its inherent completion is the basis of our ongoing pursuit of improvement and innovation. We can look forward to a future filled with designs and innovations that we cannot even yet imagine. Out of this ongoing process of experimentation, we will hopefully move toward better industrial systems… systems that begin to address some of the alarming negative feedback we currently face. ■

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